

REMARKS

Claims 1-21 are pending. Claims 1, 8, 17, and 21 have been amended. No new matter has been introduced. Reexamination and reconsideration of the present application are respectfully requested.

In the February 12, 2003 Final Office Action, the Examiner rejected claims 1-21. The Examiner rejected claims 1-3, 6, and 7 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,434,618 to Cohen et al. (the Cohen reference), in view of U.S. Patent No. 6,424,621 to Ramaswamy (the Ramaswamy reference). The Examiner rejected claims 4 and 5 under 35 U.S.C. § 103(a) as being obvious over the Cohen reference, in view of the Ramaswamy reference, and further in view of U.S. Patent No. 5,742,607 to Beighe et al. (the Beighe reference). The Examiner rejected claims 8-16 and 17-21 for the reasons as set forth with respect to claims 1-7 above. These rejections are respectfully traversed.

The present invention relates to a computer system that allows proprietary forwarding elements to interoperate with standard control elements in an open network architecture. The computer system includes a forwarding element that is adapted to perform data forwarding functions in a computer network. A control element is adapted to perform network signaling and control functions in the computer network. The control element is adapted to generate a uniform standardized data set for configuring the forwarding element. An interconnecting element operatively connects the forwarding element to the control element. A forwarding element plugin is integrated with the control element for receiving the uniform standardized data set from the control element, translating the uniform standardized data set into a proprietary specialized

data set to the forwarding element, and transmitting the proprietary specialized data set to the forwarding element to configure the forwarding element. The forwarding element utilizes the proprietary specialized data set to configure the forwarding element for performing data forwarding in the computer network.

Independent claim 1, as amended, recites:

a forwarding element adapted to perform data forwarding in a computer network;

a control element adapted to perform network signaling and control in the computer network, wherein the control element is adapted to generate a uniform standardized data set for configuring the forwarding element;

an interconnecting element operatively connecting the forwarding element to the control element; and

a forwarding element plugin integrated with the control element for receiving the uniform standardized data set from the control element, *translating the uniform standardized data set into a proprietary specialized data set to the forwarding element*, and transmitting the proprietary specialized data set to the forwarding element to configure the forwarding element, wherein the forwarding element utilizes the proprietary specialized data set to configure the forwarding element for performing data forwarding in the computer network.

The Cohen reference is directed to a programmable network element that operates on packet traffic flowing through the element in accordance with a gateway program that is dynamically uploaded into the network element or unloaded from it via a mechanism separate from the actual packet traffic as the element operates. The

programmable network element simultaneously operates on plural packet flows with different or the same programs being applied to each flow. A dispatcher provides a packet filter with a set of rules provided by one or more of the dynamically loaded and invoked programs. These rules define, for each program, the characteristics of those packets flowing through the network element that are to be operated upon in some manner. A packet that flows from the network through the filter and satisfies one or more of such rules is sent by the packet filter to the dispatcher. The dispatcher, in accordance with one of the programs, either sends the packet to the program for manipulation by the program itself, or manipulates the packet itself in a manner instructed by the program. The processed packet is sent back through the filter to the network for routing to its destination.

The Cohen reference does not disclose, teach, or suggest the system of independent claim 1, as amended. As already acknowledged by the Examiner, "Cohen does not explicitly teach a control element adapted to perform network signaling and control in the computer network, wherein the control element is adapted to generate a standardized data set for configuring the forwarding element" (Office Action, page 3, lines 5-8).

Moreover, unlike the system of independent claim 1, as amended, the Cohen reference does not disclose a forwarding element plugin integrated with the control element for receiving the uniform standardized data set from the control element, *translating the uniform standardized data set into a proprietary specialized data set to the forwarding element*, and transmitting the proprietary specialized data set to the forwarding element to configure the forwarding element, wherein the forwarding

element utilizes the proprietary specialized data set to configure the forwarding element for performing data forwarding in the computer network. The Cohen reference teaches that a network element is programmable by loading programs onto the element (col. 2, lines 8-9). The Cohen reference specifically teaches that IP packets do not need to be modified (col. 2, lines 17-18), nor do the endpoints (col. 2, line 21). Independent claim 1, as amended, differs from the Cohen reference because the forwarding element plugin is integrated with the control element for receiving the uniform standardized data set from the control element and *translating the uniform standardized data set into a proprietary specialized data set to the forwarding element.*

In particular, there is no mention in the Cohen reference of converting standard commands (e.g., filter rules) into proprietary formats for heterogeneous underlying forwarding element devices (such as NPUs and ASICs), and more specifically, of receiving the uniform standardized data set from the control element and *translating the uniform standardized data set into a proprietary specialized data set to the forwarding element*, as recited in independent claim 1, as amended. Assuming that the dispatcher process and the packet filter process are tightly integrated with the underlying forwarding element, the Cohen reference actually teaches away from the system of independent claim 1, as amended. That is, the rules generated in the dispatcher (item 402 in Fig. 4) and passed to the packet filter (item 403) are all forwarding element (and in the instant case, Linux) specific (col. 2, lines 39-40). Accordingly, the system of independent claim 1, as amended, distinguishes over the Cohen reference because there is no mention at all in the Cohen reference of a forwarding element plugin integrated with the control element for receiving the uniform standardized data set from

the control element, *translating the uniform standardized data set into a proprietary specialized data set to the forwarding element*, and transmitting the proprietary specialized data set to the forwarding element to configure the forwarding element, wherein the forwarding element utilizes the proprietary specialized data set to configure the forwarding element for performing data forwarding in the computer network.

The Ramaswamy reference does not make up for the deficiencies of the Cohen reference. The Ramaswamy reference is directed to a data packet switching system having a plurality of network interfaces each adapted to be coupled to respective external networks for receiving and sending data packets to and from the external networks via a particular communication protocol. The data packet switching system further includes a plurality of symmetrical processors, including a first processor providing a control processor and remaining ones of the processors each providing data packet switching processors. The data packet switching processors are coupled to the plurality of network interfaces. The control processor further includes a user portion and an operating system portion. The operating system portion is provided with a pseudo-network driver that appears to be a network interface to user application programs operating on the user portion of the control processor. A memory space is shared by the control processor and the data packet switching processors. The data packet switching processors route an incoming data packet directed to a user application program to the memory space. The pseudo-network driver retrieves the incoming data packet from the shared memory space and provides the data packet to the user application program.

The Ramaswamy reference does not disclose, teach, or suggest the system of

independent claim 1, as amended. Unlike the system of independent claim 1, as amended, the Ramaswamy reference does not show a forwarding element plugin integrated with the control element for receiving the uniform standardized data set from the control element, *translating the uniform standardized data set into a proprietary specialized data set to the forwarding element*, and transmitting the proprietary specialized data set to the forwarding element to configure the forwarding element, wherein the forwarding element utilizes the proprietary specialized data set to configure the forwarding element for performing data forwarding in the computer network. The Ramaswamy reference only teaches how router functions may be partitioned across general purpose processors (col. 6, lines 25-26) and assumes only a specific communication mechanism (col. 6, line 33 and 42). However, nothing in the Ramaswamy reference teaches a forwarding element plugin for *translating the uniform standardized data set into a proprietary specialized data set to the forwarding element*, as recited in independent claim 1, as amended. Accordingly, applicants respectfully submit that independent claim 1, as amended, distinguishes over the Ramaswamy reference.

The Beighe reference does not make up for the deficiencies of the Cohen reference and the Ramaswamy reference. The Beighe reference is directed to a method and apparatus for controlling two way communication via disparate physical media. A computer includes a central processor, a forward channel interface, a return channel interface, and a main memory, each being coupled to a bus. The forward channel interface is further coupled to interrupt the central processor and coupled to receive a packet from a forward channel. The main memory contains an interrupt

service routine having a first set of code for passing the packet to a routine for decapsulating the packet, and a second set of code for passing a second packet to the return channel interface. The method includes a computer transferring a packet from a forward channel interface to a main memory. The central processor analyzes the packet to determine if the packet is a data packet or a network management packet. If the packet is a network management packet, the central processor creates a response packet and passes the response packet to a return channel interface.

The Beighe reference does not disclose, teach, or suggest the system of independent claim 1, as amended. Unlike independent claim 1, as amended, the Beighe reference does not make any mention of a forwarding element plugin integrated with the control element for receiving the uniform standardized data set from the control element, *translating the uniform standardized data set into a proprietary specialized data set to the forwarding element*, and transmitting the proprietary specialized data set to the forwarding element to configure the forwarding element, wherein the forwarding element utilizes the proprietary specialized data set to configure the forwarding element for performing data forwarding in the computer network. The Beighe reference only discloses a system for controlling two-way communications having an interrupt service routine that handles the decapsulation of data packets (col. 2, lines 24-48; and Fig. 3). Accordingly, applicants respectfully submit that independent claim 1, as amended, distinguishes over the above-cited references.

Independent claims 8 and 17, both as amended, recite limitations similar to independent claim 1, as amended. Claims 2-7 all directly depend from independent claim 1, as amended. Claims 9-16 all directly depend from independent claim 8, as

amended. Claims 18-21, all as amended, all directly depend from independent claim 17, as amended. Accordingly, applicants respectfully submit that claims 2-21 distinguish over the above-cited references for the reasons set forth above with respect to independent claim 1, as amended.

Applicants believe that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call either of the undersigned attorneys at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

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Date: July 11, 2003

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